

PG&E Quality Control and Quality Assurance
Standards for Relocation of Segment 180 in
1956



VIA EMAIL

July 7, 2011

Mr. Ravindra Chhatre, P.E., Accident Investigator
National Transportation Safety Board
490 L'Enfant Plaza, East S.W.
Washington, DC 20594

Mr. Sunil Shori
Utilities Safety and Reliability Branch
Consumer Protection and Safety Division
California Public Utilities Commission
505 Van Ness Avenue, Room 2005
San Francisco, CA 94102-3298

Re: San Bruno GT Line Incident - NTSB Investigation

Dear Ravi and Sunil:

Attached in this email is a data response and responsive document for the following request. On Friday, July 8, 2011, we will send (via FedEx) a DVD with a compilation of all the responses and documentation produced during the week.

NTSB_010-005-S4 Please provide any and all construction quality assurance or quality control standards or guidelines that would have been in place and applicable for the relocation of segment 180 during the 1956 GM136471 project.

Very truly yours,

/GEC

William D. Hayes

Attachments

**PACIFIC GAS AND ELECTRIC COMPANY
San Bruno Gas Transmission Line Incident
Data Response**

PG&E Data Request No.:	NTSB_010-005-S4		
PG&E File Name:	San Bruno GT Line Incident DR_NTSB_010-005-S4		
Request Date:	June 9, 2011	Requesting Party:	NTSB
Date Sent:	July 7, 2011	Requestor:	Operations (Chhatre/Nicholson)

QUESTION 5

Please provide any and all construction quality assurance or quality control standards or guidelines that would have been in place and applicable for the relocation of segment 180 during the 1956 GM136471 project.

ANSWER 5 – SUPPLEMENT 4

Supplementing PG&E's prior response, please see attached Gas Standard and Specifications which PG&E is informed and believes were applicable, or a prior iteration of the attached standards were applicable, during the segment 180 relocation.

Given the breadth of the request and the extremely short response time allowed, PG&E has not been able to conduct an exhaustive records search and cannot confidently assert that the attached document as well as the documents previously produced in response to this data request reflect "any and all" potentially responsive documents.

GAS STANDARDS AND SPECIFICATIONS

P • G • and E •

DEPARTMENT OF GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
215 MARKET ST., SAN FRANCISCO

PIPE SIZE	DIAMETER		WALL THICKNESS	CIRCUMFERENCE		TRANSVERSE AREA			LENGTH PER SQ. FOOT OF EXTERNAL SURFACE	VOLUME PER FOOT OF PIPE		GALLONS PER FOOT OF PIPE	WEIGHT PER FOOT PLAIN ENDS	FEET PER TON
	EXTERNAL	INTERNAL		EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	TOTAL		EXTERNAL	INTERNAL			
INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	SQ. INS.	SQ. INS.	SQ. INS.	FEET	CU. FT.	CU. FT.	POUNDS		
1/8	.405	.269	.068	1.272	.845	.129	.057	.072	9.431	.0009	.0004	.0030	.245	8171.7
1/4	.540	.364	.088	1.696	1.144	.229	.104	.125	7.074	.0016	.0007	.0054	.425	4707.9
3/8	.675	.493	.091	2.121	1.549	.358	.191	.167	5.659	.0025	.0013	.0099	.568	3523.7
1/2	.840	.622	.109	2.639	1.954	.554	.304	.250	4.547	.0038	.0021	.0158	.851	2350.2
3/4	1.070	.824	.113	3.299	2.589	.866	.533	.333	3.638	.0060	.0037	.0277	1.131	1768.6
1	1.315	1.049	.133	4.131	3.256	1.358	.864	.494	2.905	.0094	.0060	.0449	1.679	1191.2
1 1/4	1.660	1.380	.140	5.215	4.335	2.164	1.496	.669	2.301	.0150	.0104	.0777	2.273	880.0
1 1/2	1.900	1.610	.145	5.969	5.058	2.835	2.036	.799	2.010	.0197	.0141	.1058	2.718	735.9
2	2.375	2.067	.154	7.461	6.494	4.430	3.356	1.075	1.608	.0308	.0233	.1743	3.653	547.5
2 1/2	2.875	2.469	.203	9.032	7.757	6.492	4.788	1.704	1.329	.0451	.0332	.2487	5.793	345.2
3	3.500	3.068	.216	10.996	9.638	9.621	7.393	2.228	1.091	.0668	.0554	.3840	7.576	264.0
3 1/2	4.000	3.548	.226	12.566	11.146	12.566	9.887	2.680	.955	.0873	.0687	.5136	9.109	219.6
4	4.500	4.026	.237	14.137	12.648	15.904	12.730	3.174	.849	.1104	.0884	.6613	10.790	185.3
5	5.563	5.047	.258	17.477	15.856	24.306	20.006	4.300	.687	.1688	.1389	1.0393	14.618	136.8
6	6.625	6.065	.280	20.813	19.054	34.472	28.890	5.581	.577	.2394	.2096	1.5008	18.974	105.4
8	8.625	7.881	.322	27.096	25.073	58.426	50.027	8.399	.443	.4057	.3474	2.5988	28.554	70.0
10	10.750	10.020	.365	33.772	31.479	90.763	78.854	11.908	.355	.6303	.5476	4.0963	40.483	49.4
12	12.750	12.000	.375	40.055	37.699	127.676	113.097	14.579	.300	.8866	.7854	5.8752	49.563	40.4
14	14.000	13.250	.375	43.982	41.626	153.938	137.886	16.052	.273	1.0690	.9575	7.1629	54.569	36.7
16	16.000	15.250	.375	50.265	47.909	201.082	182.654	18.408	.239	1.3963	1.2684	9.4885	62.579	32.0
18	18.000	17.250	.375	56.549	54.192	254.469	233.705	20.764	.212	1.7671	1.6230	12.1405	70.589	28.3
20	20.000	19.250	.375	62.832	60.476	314.159	291.039	23.120	.191	2.1817	2.0211	15.1189	78.599	25.4
22	22.000	21.250	.375	69.115	66.759	380.233	354.656	25.476	.174	2.6398	2.4629	18.4237	86.609	23.1
24	24.000	23.250	.375	75.398	73.042	452.389	424.557	27.833	.159	3.1416	2.9483	22.0549	94.820	21.1
26	26.000	25.250	.375	81.681	79.325	530.929	500.740	30.189	.147	3.6870	3.4774	26.0125	102.630	19.5
28	28.000	27.250	.375	87.965	85.608	615.752	583.207	32.545	.136	4.2761	4.0501	30.2965	110.640	18.1
30	30.000	29.250	.375	94.248	91.892	706.858	671.957	34.901	.127	4.9087	4.6664	34.9069	118.650	16.9
32	32.000	31.250	.375	100.531	98.175	804.248	766.990	37.257	.119	5.5851	5.3263	39.8437	126.660	15.8
34	34.000	33.250	.375	106.814	104.458	907.920	868.307	39.614	.112	6.3050	6.0299	45.1068	134.670	14.9
36	36.000	35.250	.375	113.097	110.741	1017.876	975.906	41.970	.106	7.0686	6.7772	50.6964	142.680	14.0

References:
American Standard Wrought-Steel and Wrought-Iron Pipe (ASA-B36.10-1959)
For Gas Line Pipe Data - Dwg. 282780, L-16, A-10.

1	7-5-60	Added data 28"-36" incl.	J.L.L.				
CHK.	DATE	DESCRIPTION	APPR.	CHK.	DATE	DESCRIPTION	APPR.

APPROVED		GAS DEPARTMENT STANDARD				SUPERSEDES 180949	
BY DEPT. OF G.O.		STANDARD PIPE DATA.				SUPERSEDED BY	
DR. O.C. TR.		PACIFIC GAS AND ELECTRIC COMPANY				SHEET NO. SHEETS	
CH. O.Y.		SAN FRANCISCO, CAL.				DRAWING NUMBER QUANTITY	
O.K.						282780 1	
DATE	SCALE						
11-24-59.							

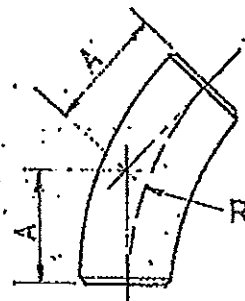
A-11.1 14

SP. 22

PIPE SIZE INCHES	DIAMETER		WALL THICKNESS INCHES	CIRCUMFERENCE		TRANSVERSE AREA			LENGTH PER SQ. FOOT OF EXTERNAL SURFACE FEET	VOLUME PER FOOT OF PIPE		GALLONS PER FOOT OF PIPE	WEIGHT PER FOOT PLAIN ENDS POUNDS	FEET PER TON
	EXTERNAL INCHES	INTERNAL INCHES		EXTERNAL INCHES	INTERNAL INCHES	EXTERNAL SQ. INCHES	INTERNAL SQ. INCHES	METAL SQ. INCHES		EXTERNAL CU. FEET	INTERNAL CU. FEET			
1/8	.405	.215	.095	1.272	.675	.129	.036	.093	9.431	.0009	.0009	.0919	.315	6358.7
1/4	.540	.302	.119	1.696	.949	.229	.072	.157	7.074	.0016	.0005	.0037	.535	3727.9
3/8	.675	.423	.126	2.121	1.329	.358	.141	.217	5.659	.0025	.0010	.0073	.739	2707.1
1/2	.840	.546	.147	2.639	1.715	.554	.234	.320	4.547	.0038	.0016	.0122	1.088	1818.2
3/4	1.050	.742	.154	3.299	2.331	.866	.432	.433	3.638	.0060	.0030	.0225	1.474	1357.1
1	1.315	.957	.179	4.131	3.007	1.358	.719	.639	2.905	.0094	.0050	.0374	2.172	920.9
1 1/4	1.660	1.278	.191	5.215	4.015	2.164	1.283	.881	2.301	.0150	.0089	.0666	2.997	667.4
1 1/2	1.900	1.500	.200	5.969	4.712	2.835	1.767	1.068	2.010	.0197	.0123	.0918	3.631	550.8
2	2.375	1.939	.218	7.461	6.092	4.430	2.953	1.577	1.608	.0308	.0205	.1534	5.022	398.2
2 1/2	2.875	2.323	.276	9.032	7.298	6.492	4.238	2.254	1.329	.0451	.0294	.2202	7.661	261.1
3	3.500	2.900	.300	10.996	9.111	9.621	6.605	3.016	1.091	.0668	.0459	.3431	10.253	195.1
3 1/2	4.000	3.364	.318	12.566	10.568	12.566	8.888	3.678	.955	.0873	.0617	.4617	12.505	159.9
4	4.500	3.826	.337	14.137	12.020	15.904	11.497	4.407	.849	.1104	.0798	.5972	14.984	133.5
5	5.563	4.813	.375	17.477	15.120	24.306	18.794	6.212	.687	.1688	.1263	.9451	20.778	94.3
6	6.625	5.761	.432	20.813	18.099	34.472	26.067	8.405	.577	.2394	.1810	1.3541	28.593	70.0
8	8.625	7.625	.500	27.056	23.955	58.426	45.664	12.763	.443	.4037	.3171	2.3721	43.388	46.1
10	10.750	9.750	.500	33.772	30.631	90.763	74.662	16.101	.355	.6303	.5185	3.8785	54.736	36.5
12	12.750	11.750	.500	40.055	36.914	127.676	108.434	19.242	.300	.8866	.7530	5.6329	65.416	30.6
14	14.000	13.000	.500	43.982	40.841	153.938	132.732	21.206	.273	1.0650	.9218	6.8952	72.091	27.7
16	16.000	15.000	.500	50.265	47.124	201.062	176.715	24.347	.239	1.3563	1.2272	9.1800	82.771	24.2
18	18.000	17.000	.500	56.549	53.407	254.469	226.980	27.489	.212	1.7671	1.5763	11.7912	93.451	21.4
20	20.000	19.000	.500	62.832	59.690	314.159	283.529	30.631	.191	2.1817	1.9689	14.7288	104.132	19.2
22	22.000	21.000	.500	69.115	65.973	380.133	346.361	33.772	.174	2.6398	2.4053	17.9928	114.812	17.4
24	24.000	23.000	.500	75.398	72.257	452.389	415.476	36.914	.159	3.1416	2.8852	21.5831	125.492	15.9
26	26.000	25.000	.500	81.681	78.540	530.929	490.874	40.055	.147	3.6870	3.4088	25.4999	136.178	14.7
28	28.000	27.000	.500	87.965	84.823	615.752	572.555	43.197	.136	4.2761	3.9761	29.7431	146.852	13.6
30	30.000	29.000	.500	94.248	91.106	706.858	660.520	46.338	.127	4.9087	4.5869	34.3127	157.532	12.7
32	32.000	31.000	.500	100.531	97.389	804.248	754.768	49.480	.119	5.5853	5.2414	39.2087	168.212	11.9
34	34.000	33.000	.500	106.814	103.673	907.920	855.299	52.622	.112	6.3050	5.9396	44.4311	178.893	11.2
36	36.000	35.000	.500	113.097	109.956	1017.876	962.113	55.763	.106	7.0686	6.6813	49.9999	189.573	10.6

Reference:
American Standard Wrought-Steel and Wrought-Iron Pipe (ASA. 336.10-1959)
For Gas Line Pipe Data - Dwg. 282690, A. 12, 4. 11

1 7-5-60 Added data 28"-36" Incl.		S.L.L.			
CHK.	DATE	DESCRIPTION	APPRD.	CHKD.	DATE
APPROVED		GAS DEPARTMENT STANDARD			
BY DEPT. OF G.O.		EXTRA HEAVY PIPE DATA			
DR. O.C. TR.		PACIFIC GAS AND ELECTRIC COMPANY			
CH. B.H.		SAN FRANCISCO, CAL.			
O.K.		SUPERSEDES 150950			
DATE 12-3-58		SHEET NO. 282781			
SCALE NONE		SHEETS 1			



CODE		SIZE	RADIUS	A	NOMINAL DIAMETER			WALL THICKNESS		APPROX. WT. POUNDS		MAX. GWP PSI*	
STD.	E.H.				O.D.	I.D.		STD.	E.H.	STD.	E.H.	STD.	E.H.
022105		3/4		a	1.050	.824	.742	.113	.154	.08	.11	1848	3086
		1-		7/8	1.315	1.049	.957	.133	.179	.17	.23	1955	3066
		1-1/4		1-	1.660	1.380	1.278	.140	.191	.28	.39	1681	2646
022145	022106	1-1/2		1-1/8	1.900	1.610	1.500	.145	.200	.40	.55	1552	2463
2-		1-3/8		2.375	2.067	1.939	.154	.218	.72	1.05	1361	2213	
022107		2-1/2		1-3/4	2.875	2.469	2.323	.203	.276	1.5	2.1	1660	2467
022157		3-	6	2-	3.500	3.068	2.900	.216	.300	2.3	3.2	1481	2242
		3-1/2		2-3/4	4.000	3.548	3.364	.226	.318	3.2	4.6	1375	2097
		4		2-1/2	4.500	4.026	3.826	.237	.337	4.3	6.1	1299	2000
022158	022183	5	7-1/2	3-1/8	5.563	5.047	4.813	.258	.375	7.3	10.0	1170	1831
022008		6		3-3/4	6.625	6.065	5.761	.280	.432	11.2	17.9	1087	1810
8		5		8.625	7.891	7.625	.322	.500	22.5	35	988	1640	
022009	022148	10	12	6-1/4	10.750	10.020	9.750	.365	.500	40	55	919	1316
12		7-1/2		12.750	12.000	11.750	.375	.500	59	79	799	1110	
16		b.		16.000	15.250	15.000	.375	.500	98	131	637	884	
022148		20	30	c.	20.000	19.250	19.000	.375	.500	155	205	510	707
		24		d.	24.000	23.250	23.000	.375	.500	223	295	425	590
		30		e.	30.000	29.250	29.000	.375	.500	358	475	340	475

- # AT 1000 P.
- 1) FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A234 - MATERIAL ASTM A-106 GRADE A OR B.
 - 2) STANDARD DIMENSIONS ASA B16.9.
 - 3) MAXIMUM ALLOWABLE GWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B31.1), GAS & AIR PIPING AT 100^{OP} (SECTION 2, DIV.1) - (ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS). IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GWP BY MULTIPLYING BY 1.167.
 - 4) ALL DIMENSIONS IN INCHES.

SIZES SUPPLIED	
CRANE	1" TO 16"
GRINNELL	3/4" " 12"
MIDWEST	2" " "
TAYLOR	3/4" " 24"
TUBE-TURN	" " 30"

DIMENSION	CRANE	GRINNELL	MIDWEST	TAYLOR	TUBE-TURN
a	-	7/16	3/4	9/16	7/16
b	8-1/2	-	-	10	9-15/16
c	-	-	-	12-1/2	12-7/16
d	-	-	-	15	14-15/16

3	10-52	REVISED NOTE No. 1			
2	7-30	REVISED			
1	7-16	REVISED			

CHK.	DATE	DESCRIPTION	APPROV.	CHK.	DATE	DESCRIPTION	APPROV.

APPROVED

By Dept. of G.O.

DR. _____

CH. _____

O.K. _____

DATE 8-8-45

SCALE _____

GAS DEPARTMENT STANDARD

45° LONG RADIUS WELDING ELBOWS

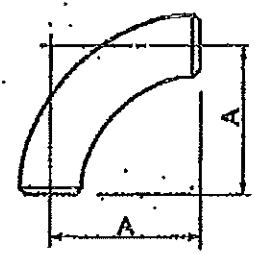
PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CAL.

SUPERSEDES	
SUPERSEDED BY	
SHEET No.	SHEETS
DRAWING NUMBER	CHANGE
081465	8

CODE	SIZE	A	NOMINAL OUTSIDE DIAMETER	NOMINAL INSIDE DIAMETER	NOMINAL WALL THICK.	APPROX WEIGHT POUNDS	MAX. GWS POUNDS
STANDARD							
022108	1/2	1-1/2	.840	.622	.109	.18	2160
	3/4	1-1/2	1.050	.824	.113	.25	1848
022076	1-	1-3/2	1.315	1.049	.133	.38	1865
022200	1-1/4	1-7/8	1.690	1.380	.140	.50	1691
022136	1-1/2	2-1/4	1.900	1.610	.146	.76	1662
022109	2-	3-	2.375	2.067	.164	1.75	1301
022103	2-1/2	3-3/4	2.875	2.469	.203	3.50	1660
	3-	4-1/2	3.500	3.068	.216	6.00	1491
022039	3-1/2	5-1/4	4.000	3.548	.228	7.00	1376
	4-	6-	4.500	4.028	.237	9.25	1239
022091	5-	7-1/2	5.563	5.047	.259	16.	1170
022083	6-	8-	6.825	6.065	.280	25.	1067
022041	8-	12	8.825	7.981	.322	50.	888
022104	10	15	10.750	10.020	.365	85.	819
022202	12	18	12.750	12.000	.375	130.	760
	16	24	16.000	15.250	.375	215.	637
	20	30	20.000	19.250	.375	315.	510
	24	36	24.000	23.250	.375	445.	425
	30	45	30.000	29.250	.375	720.	340
EXTRA HEAVY							
	3/4	1-1/8	1.050	.742	.154	.87	3088
	1-	1-3/2	1.315	.957	.179	.80	3006
	1-1/4	1-7/8	1.660	1.278	.191	.80	2846
022101	1-1/2	2-1/4	1.900	1.500	.200	.76	2459
	2-	3-	2.375	1.939	.203	1.6	2413
022198	2-1/2	3-3/4	2.875	2.322	.213	2.0	2267
	3-	4-1/2	3.500	2.900	.216	4.0	2242
022204	3-1/2	5-1/4	4.000	3.384	.228	6.5	2097
	4-	6-	4.500	3.822	.237	9.	2000
022174	6-	7-1/2	6.503	4.612	.259	18.	1831
022159	8-	9-	8.825	6.701	.280	22.	1810
	10	12	10.750	7.825	.322	35.	1640
	12	15	12.750	9.750	.365	76.	1316
022190	16	18	16.000	11.750	.375	119.	1110
	20	24	20.000	15.000	.375	185.	684
	24	30	24.000	19.000	.375	275.	707
	30	36	30.000	23.000	.375	592.	690
		45	30.000	29.000	.600	859.	476

* AT 100° F



ALL DIMENSIONS
IN INCHES

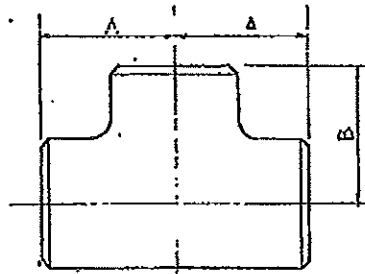
- NOTES:
1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A-234, MATERIAL ASTM-A-109 GRADE A. IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
 2. STANDARD DIMENSIONS ASA B16.9.
 3. MAXIMUM ALLOWABLE CWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B31.1), GAS & AIR PIPING AT 100°F (SECTION 2, DIV. 1) (ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS). IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE CWP BY MULTIPLYING BY 1.167.
 4. SIZES CRANE & TAYLOR, 3/4"-24"; BRINELL, 3/4"-16"; MIDWEST, 3/4"-24"; TUBE TURN, 1/2"-80°.
 5. Ø DOES NOT APPLY TO CRANE.
 6. WHEN ORDERING 16"-30" INCL. SPECIFY MANUFACTURER AND KIND.

CHG.	DATE	DESCRIPTION	APPR.	CHG.	DATE	DESCRIPTION	APPR.
APPROVED							
By Dept. of G.A.		GAS DEPARTMENT STANDARD				SUPERSEDES 081260	
DR. 1.1/1		90° LONG RADIUS WELDING ELBOWS				SUPERSEDED BY	
CH.		PACIFIC GAS AND ELECTRIC COMPANY				SHEET NO.	
O.K.		SAN FRANCISCO, CAL.				DRAWING NUMBER	
DATE 10-8-52						281992	
SCALE						CHANGE	

CODE NO.	NOMINAL PIPE SIZE	DIMENSION		OUTSIDE DIAMETER	INSIDE DIAMETER	WALL THICKNESS	APPROX. WEIGHT POUNDS	MAX. * GAP POUNDS
		A	B					
STANDARD								
022116	1/2	1	1	.840	.622	.109	.25	2160
	3/4	1-1/8	1-1/8	1.050	.824	.113	.33	1848
	1	1-1/2	1-1/2	1.315	1.049	.133	.73	1955
022178	1-1/4	1-7/8	1-7/8	1.660	1.350	.140	1.40	1681
022112	1-1/2	2-1/4	2-1/4	1.900	1.610	.145	1.93	1552
022113	2	2-1/2	2-1/2	2.375	2.067	.154	2.45	1361
022201	2-1/2	3	3	2.875	2.469	.203	5.08	1660
022137	3	3-3/8	3-3/8	3.500	3.089	.216	7.00	1481
	3-1/2	3-5/4	3-5/4	4.000	3.548	.228	9.12	1375
022144	4	4-1/8	4-1/8	4.500	4.028	.237	11.25	1289
	5	4-7/8	4-7/8	5.583	5.047	.253	21.5	1170
022150	6	5-5/8	5-5/8	6.625	6.085	.280	33.8	1087
022210	8	7	7	8.625	7.681	.322	63.8	888
	10	8-1/2	8-1/2	10.750	10.020	.355	81.	919
022198	12	10	10	12.750	12.090	.375	111.	799
	16	12	12	16.000	15.250	.375	175.	637
	20	16	C	20.000	19.250	.375	321.	610
	24	17	D	24.000	23.250	.375	448.	425
EXTRA HEAVY								
	1/2	1	1	.840	.645	.147	.80	3590
	3/4	1-1/8	1-1/8	1.050	.742	.164	.47	3083
	1	1-1/2	1-1/2	1.315	.957	.179	.67	3068
	1-1/4	1-7/8	1-7/8	1.660	1.276	.181	1.68	2346
	1-1/2	2-1/4	2-1/4	1.900	1.600	.200	2.25	2463
	2	2-1/2	2-1/2	2.375	1.939	.216	3.00	2213
	2-1/2	3	3	2.875	2.328	.278	6.00	2467
	3	3-3/8	3-3/8	3.500	2.900	.300	8.50	2242
	3-1/2	3-5/4	3-5/4	4.000	3.384	.318	11.9	2097
	4	4-1/8	4-1/8	4.500	3.828	.387	15.8	2000
	5	4-7/8	4-7/8	5.583	4.618	.375	28.	1891
022172	6	5-5/8	5-5/8	6.625	5.761	.432	44.	1810
022168	8	7	7	8.625	7.626	.600	79.	1840
	10	8-1/2	8-1/2	10.750	9.750	.600	101.	1318
	12	10	10	12.750	11.750	.600	140.	1110
	16	12	12	16.000	16.000	.600	257.	884
	20	15	C	20.000	19.000	.600	407.	707
	24	17	D	24.000	23.000	.600	563.	580

*At 100° F.

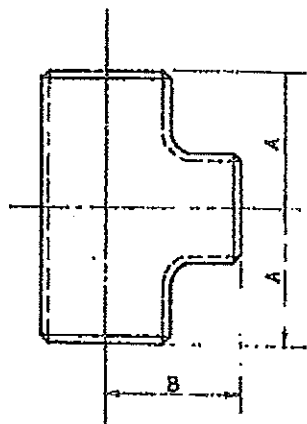
- NOTES: 1. FITTINGS TO BE MANUFACTURED IN ACCORDANCE WITH ASTM SPEC. A-234, MATERIAL ASTM A-106 GRADE A, IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
2. STANDARD DIMENSIONS ASA B 16.9
3. MAXIMUM ALLOWABLE GAP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 31.1), GAS AND AIR PIPING AT 100°F (SECTION 2, DIVISION 1). ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GAP BY MULTIPLYING BY 1.167
4. DIMENSION "C" CRANE & MINWEST 12-1/2" TUBE-TURN 15"
"D" " " " " 14-3/4" " " " " 17"
5. ALL DIMENSIONS IN INCHES
6. SIZES CRANE & MINWEST 3/4"-24" CRIMSILL 3/4"-12". TAYLOR 3/4"-16", TUBE-TURN 1/2"-24"



99-52 CHANGED : NOTE 1		APPROVED		DESCRIPTION		APPROVED	
CHG.	DATE	DESCRIPTION	APPROV.	CHG.	DATE	DESCRIPTION	APPROV.
APPROVED				SUPERSEDES 081261			
By Dept. of G.O.				SUPERSEDED BY			
DR. A. Mergenthaler				SHEET NO.			
CH. 111.1				SHEETS			
C. K.				281760			
DATE 3-1-40		SCALE None.		SAN FRANCISCO, CAL.			

CODE		SIZE - INCHES				DIMENSION INCHES		APPROX. WT. LBS.		MAXIMUM G.P.P.S.I.	
STD.	E.H.					A	B	STD.	E.H.	STD.	E.H.
		1	X 1	X 1/2	5/4	1-1/2	1-1/2	.77	.67	1055	3098
		1	X 1	X 1	5/4	1-1/2	1-1/2	.80	.95	1048	
		1-1/2	X 1-1/2	X 1-1/2	5/4	2-1/4	2-1/4	2.12	2.45	1652	2489
		1-1/2	X 1-1/2	X 1-1/2	5/4	2-1/4	2-1/4	2.20	2.60		
		2	X 2	X 1-1/2		2-1/2	2-3/8	2.33	3.0	1821	2213
		2	X 2	X 1-1/2		2-1/2	2-3/8	2.72	3.5		
		2-1/2	X 2-1/2	X 1-1/2		3	2-1/4	4.23	5.2	1680	2487
		2-1/2	X 2-1/2	X 1-1/2		3	2-5/8	4.76	5.2		
		2-1/2	X 2-1/2	X 2		3	2-3/4	5.16	6.0		
022214		3	X 3	X 1-1/2		3-3/8	2-5/8	6.0	7.6	1481	2242
		3	X 3	X 2		3	2-7/8	6.4	7.6		
		3	X 3	X 2-1/2		3	3-1/4	7.5	9.0		
		3	X 3	X 2-1/2		3	3-1/4	7.6	9.0		
022188		4	X 4	X 1-1/2		4-1/8	3-3/8	10.8	13.0	1289	2020
		4	X 4	X 2		4	3-1/2	10.8	13.0		
		4	X 4	X 2-1/2		4	3-3/4	10.8	13.0		
		4	X 4	X 3		4	3-7/8	10.8	13.0		
022205		6	X 6	X 2-1/2		5-5/8	4-3/4	32.0	41.8	1037	1810
		6	X 6	X 3		5	4-7/8	32.5	41.0		
		6	X 6	X 4		5	5-1/8	31.8	41.5		
		8	X 8	X 3		7	6	50.0	67.8	988	1640
		8	X 8	X 4		7	6-1/8	49.3	67.3		
		8	X 8	X 4		7	6-5/8	52.5	68.0		
		10	X 10	X 4		8-1/8	7-1/4	75	92	919	1818
		10	X 10	X 5		8	7-5/8	79	94		
		10	X 10	X 6		8	8	77	100		
		12	X 12	X 6		10	8-5/8	105	136	789	1110
		12	X 12	X 8		10	9	106	134		
		12	X 12	X 10		10	9-1/2	107	140		
		16	X 16	X 8		12	a	63	110	687	884
		16	X 16	X 8		12	b	103	141		
		16	X 16	X 10		12	11-1/8	110	158		
		16	X 16	X 12		12	11-5/8	128	167		
		20	X 20	X 8		16	12-3/4	285	367	610	707
		20	X 20	X 10		16	13-1/8	286	368		
		20	X 20	X 12		16	c	286	369		
		20	X 20	X 16		16	d	292	373		
		24	X 24	X 10		17	15-1/8	412	530	425	530
		24	X 24	X 12		17	15-5/8	413	531		
		24	X 24	X 16		17	e	417	535		
		24	X 24	X 20		17	f	422	539		

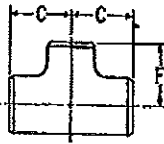
* AT 100° F.



DIMENSION	a	b	c	d	e	f
CRANE	-	10-5/8	12-1/2	12-1/2	14-3/4	14-3/4
HIGHEST	-	-	-	-	-	-
TAYLOR	10-1/4	-	-	-	-	-
TUBE-TURN	10-3/8	10-3/4	16-5/8	14	16	17

- NOTES: 1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A-284, MATERIAL ASTM A-103 GRADE A. IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
 2. STANDARD DIMENSIONS ASA B 16.8
 3. MAXIMUM ALLOWABLE G.P.P. BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 21.1) GAS AND AIR PIPING AT 100° F. (SECTION 2, DIVISION 1). ALLOWANCE IS MADE FOR MILL FERRITING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE G.P.P. BY MULTIPLYING BY 1.167.
 4. ALL DIMENSIONS IN INCHES
 5. WALL THICKNESS SAME AS MS 1054
 6. DIMENSIONS APPLY TO CRANE, MIDWEST, TAYLOR & TUBE-TURN
 7. B MADE BY TUBE-TURN ONLY

CHG.	DATE	DESCRIPTION	APPROV.	CHG.	DATE	DESCRIPTION
1	9-9-52	CHANGED NOTE 1				
APPROVED			SUPERSEDED 081298			
By Dept of E.O.			GAS DEPARTMENT STANDARD			
By A.G. Hergentelmech			REINFORCING WELDING TEES-FEEL END TYPE			
C.H.			DEPARTMENT OF ENGINEERING			
O.K.			PACIFIC GAS AND ELECTRIC COMPANY			
DATE 7-27-50			SAN FRANCISCO, CAL.			
SCALE None.			SUPERSEDED BY		SHEET NO. 281777	
					1	



NOMINAL PIPE SIZE	DIMENSION	
	C	F
1 x 1 x 1/2	1-1/2	1-1/2
1 x 1 x 3/4	1-1/2	1-1/2
1-1/2 x 1-1/2 x 3/4	2-1/4	2-1/4
1-1/2 x 1-1/2 x 1	2-1/4	2-1/4
2 x 2 x 1	2-1/2	2
2 x 2 x 1-1/2	2-1/2	2-3/8
2-1/2 x 2-1/2 x 1	3	2-1/4
2-1/2 x 2-1/2 x 1-1/2	3	2-5/8
2-1/2 x 2-1/2 x 2	3	2-3/4
3 x 3 x 1	3-3/8	2-5/8
3 x 3 x 1-1/2	3-5/8	2-7/8
3 x 3 x 2	3-3/8	3
3 x 3 x 2-1/2	3-3/8	3-1/4
4 x 4 x 1-1/2	4-1/8	3-3/8
4 x 4 x 2	4-1/8	3-1/2
4 x 4 x 2-1/2	4-1/8	3-3/4
4 x 4 x 3	4-1/8	3-7/8
6 x 6 x 2-1/2	5-5/8	4-3/4
6 x 6 x 3	5-5/8	4-7/8
6 x 6 x 4	5-5/8	5-1/8
8 x 8 x 3	7	6
8 x 8 x 4	7	6-1/8
8 x 8 x 6	7	6-5/8
10 x 10 x 4	8-1/2	7-1/4
10 x 10 x 5	8-1/2	7-5/8
10 x 10 x 8	8-1/2	8
12 x 12 x 6	10	8-5/8
12 x 12 x 8	10	9
12 x 12 x 10	10	9-1/2
16 x 16 x 6	12	10-3/8
16 x 16 x 8	12	10-3/4
16 x 16 x 10	12	11-1/8
16 x 16 x 12	12	11-5/8
20 x 20 x 8	15	12-3/4
20 x 20 x 10	15	13-1/8
20 x 20 x 12	15	13-5/8
20 x 20 x 18	15	14
24 x 24 x 10	17	15-1/8
24 x 24 x 12	17	15-5/8
24 x 24 x 16	17	16
24 x 24 x 20	17	17

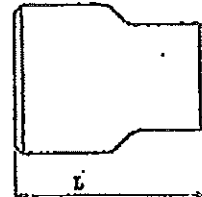
ALL DIMENSIONS ARE IN INCHES.

1. FITTINGS 1" TO 24" SHALL HAVE DIMENSIONS, TOLERANCES, AND BE MANUFACTURED IN ACCORDANCE WITH A.S.A. STANDARD B16.9 (STEEL BUTT-WELDING FITTINGS); 26" AND LARGER IN ACCORDANCE WITH MSS STANDARD PRACTICE SP 48 (STEEL BUTT-WELDING FITTINGS.)
2. FITTINGS 20" AND SMALLER ARE TO BE MANUFACTURED FROM WROUGHT CARBON STEEL, GRADE W.P.B. VARIETY, CONFORMING TO REQUIREMENTS OF A.S.T.M. SPECIFICATION A234 FOR GRADE B FITTINGS.

APPROVED									
NO.		DATE		DESCRIPTION		BY			
SUPERV. BY D.F. Johnson				<p style="text-align: center;">GAS STANDARD REDUCING WELDING TEES BEVEL END TYPE</p> <p style="text-align: center;">PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>		SUPERSEDER			
DR. J. Austin						SUPERSEDER BY			
CH.						SHEET NO.		SHEETS	
O.K. ✓						DRAWING NUMBER		CHANGE	
DATE 6-1-64		SCALE None				283220			

CODE NO.		SIZE INCHES	L INCHES	APPROX. WT. LBS.		MAX. GAS W.P. PSI	
STDR. SDR.	EXTRA SDR.			STD.	X.H.	STD.	X.H.
		3/4 x 1/2 3/4 x 3/8	1-1/2	.21 .21	.88 .24	2160 *	3590 *
		1 x 3/4	2	.41	.64	1848	3068
022180		1-1/4 x 1 1-1/4 x 3/4	3	.59 .60	.75 .68	1691	2848
		1-1/2 x 1-1/4 1-1/2 x 1 1-1/2 x 3/4	2-1/2	.78 .84 .66	.98 .85 .75	1622 *	2463 *
022992 022176 022181	022147 022116	2 x 1-1/2 2 x 1-1/4 2 x 1 2 x 3/4	3	.93 .87 .78 .69	1.25 1.17 1.04 .86	1361 *	2218 *
		2-1/2 x 2 2-1/2 x 1-1/2 2-1/2 x 1-1/4 2-1/2 x 1	3-1/2	1.60 1.25 1.25 1.25	2.00 1.76 1.60 1.60	1660 *	2487 *
022993		3 x 2-1/2 3 x 2 3 x 1-1/2 3 x 1-1/4	3-1/2	2.00 1.75 1.60 1.60	2.69 2.25 2.25 2.25	1481 *	2242 *
022170		3 x 1	4	1.60	2.25	*	*
022097		4 x 2-1/2 4 x 2 4 x 1-1/2 4 x 1-1/4 4 x 1	4	3.75 3.25 3.25 3.25 3.25	5.00 5.00 4.60 4.60 4.60	1899 *	2000 *
022025	022177			3.25 3.25 3.25	4.60 4.60 4.60	*	*
022164 022189 022085	022027	6 x 4 6 x 3-1/2 6 x 3 6 x 2-1/2 6 x 2	5-1/2	8.25 7.75 7.60 7.00 6.80	11.0 10.0 10.0 9.0 8.5	1097 *	1810 *
022042 022163		8 x 6 8 x 4 8 x 3-1/2 8 x 3	6	13. 11. 11. 11.	18. 18. 15. 14.	968 *	1640 *
022097 022099		10 x 8 10 x 6 10 x 4	7	22. 21. 20.	27. 25. 24.	919 *	1316 *
022193 022167 022816		12 x 10 12 x 8 12 x 6 12 x 4	8	33. 30. 28. 28.	40. 39. 37. 34.	798 *	1110 *
	022191	16 x 12 16 x 10 16 x 8	a b b	70. 68. 66.	98. 90. 88.	697 *	684 *
	022192	20 x 16 20 x 12	c d	133. 127.	160. 154.	610 *	707 *
		24 x 16 24 x 20	e e	160. 167.	211. 220.	486 *	590 *

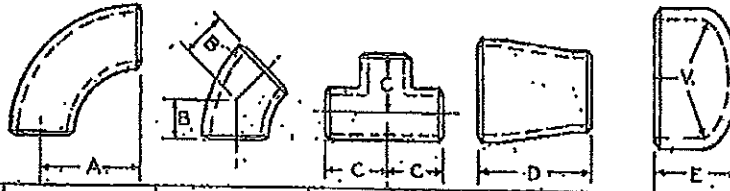
* AT 100°F.



- a
- Crane 14
- Grinnell 14
- Midwest 14
- Taylor 12
- Tube Turn 14
- b
- Crane 14
- Grinnell 14
- Midwest 14
- Taylor 18
- Tube Turn 14
- c
- Crane 20
- Grinnell 18
- Midwest 20
- Taylor 18
- Tube Turn 20
- d
- Crane 20
- Grinnell 18
- Midwest 20
- Taylor 18
- Tube Turn 20
- e
- Crane 20
- Midwest 20
- Taylor 18
- Tube Turn 20

NOTES: 1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A-284, MATERIAL ASTM-A-106 GRADE A, IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
 2. STANDARD DIMENSIONS ASA B 16.9
 3. MAXIMUM ALLOWABLE GAP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 81.1), GAS & AIR PIPING AT 100°F (SECTION 2, DIV. 1). ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GAP BY MULTIPLYING BY 1.167.

2	9-9-52	CHANGED NOTE 1						
1	2-6-52	CH'D PRESS. RATING 24" SIZE						
CHK.	DATE	BY	APPROVED	CHK.	DATE	BY	APPROVED	
APPROVED By Dept of G.O. Dr. L.G. Margenthaler CH. _____ O.K. DATE 7-27-56 SCALE None.			GAS DEPARTMENT STANDARD CONCENTRIC WELDING REDUCERS DEPARTMENT OF ENGINEERING PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.				SUPERSEDES 0812.62 SUPERSEDED BY SHEET NO. 281778 2	



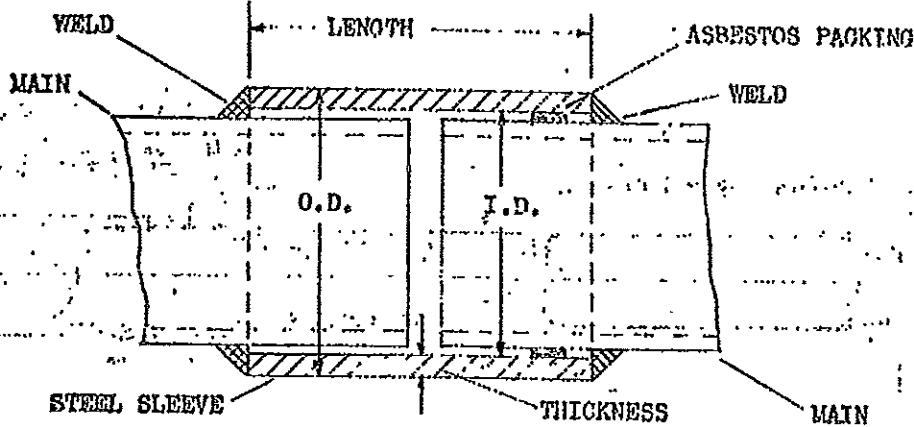
NOMINAL PIPE SIZE	90° ELBOW CENTER TO FACE A	45° ELBOW CENTER TO FACE B	STRAIGHT TEE C	CONCENTRIC REDUCER D	CAP E	STD. CAP VOLUME CU. INS. V.
3/4"	1 1/8"	7/16"	1 1/8"	1 1/2"	1 1/4"	.6
1"	1 1/2"	7/8"	1 1/2"	2"	1 1/2"	1.1
1 1/4"	1 7/8"	1"	1 7/8"	2"		1.9
1 1/2"	2 1/4"	1 1/8"	2 1/4"	2 1/2"		2.5
2"	3"	1 3/8"	2 1/2"	3"		3.9
3"	4 1/2"	2"	3 3/8"	3 1/2"	2"	11.3
4"	6"	2 1/2"	4 1/8"	4"	2 1/2"	24.5
6"	9"	3 3/4"	5 5/8"	5 1/2"	3 1/2"	78.4
8"	12"	5"	7"	6"	4"	150.7
10"	15"	6 1/4"	8 1/2"	7"	5"	299.1
12"	18"	7 1/2"	10"	8"	6"	523.1
14"	21"	8 3/4"	11"	13"	6 1/2"	664
16"	24"	10"	12"	14"	7"	978.0
18"	27"	11 1/4"	13 1/2"	15"	8"	1380.0
20"	30"	12 1/2"	15"	20"	9"	2043.3
22"	33"	13 1/2"	16 1/2"	20"	10"	2654.0
24"	36"	15"	17"	20"	10 1/2"	3476.1
26"	39"	16"	19 1/2"	24"		3813
30"	45"	18 1/2"	22"			4927
34"	51"	21"	25"			6161
36"	54"	22 1/4"	26 1/2"			6822

ALL DIMENSIONS ARE IN INCHES

- FITTINGS 1" TO 24" SHALL HAVE DIMENSIONS, TOLERANCES, AND BE MANUFACTURED IN ACCORDANCE WITH A.S.A. STANDARD B16.9 (STEEL BUTT-WELDING FITTINGS); 26" AND LARGER IN ACCORDANCE WITH MSS STANDARD PRACTICE SP 48 (STEEL BUTT-WELDING FITTINGS).
- FITTINGS 20" AND SMALLER ARE TO BE MANUFACTURED FROM WROUGHT CARBON STEEL, GRADE W.P. B, VARIETY, CONFORMING TO REQUIREMENTS OF A.S.T. M. SPECIFICATION A234 FOR GRADE B FITTINGS.
- FITTINGS 16" THROUGH 36" NOT COVERED ABOVE ARE TO BE DESIGNED SO THAT THE PRESSURE RATING IS THE SAME AS FOR PIPE MATERIAL OF THE SAME WALL THICKNESS MANUFACTURED TO A.P.I. 5LX SPECIFICATIONS, AS INDICATED ON MS-1052.

CHG.	DATE	DESCRIPTION	APP'D.	CHG.	DATE	DESCRIPTION	APP'D.
APPROVED		GAS STANDARD DIMENSIONS STEEL BUTT-WELDING FITTINGS				SUPERSEDED BY SUPERSEDED 28132 28135 28221	
BY	G. S. D. D.	PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.				SUPERSEDED BY	
DR.	SBS TR.					SHEET NO. SHEETS	
CH.						DRAWING NUMBER	
C. K.						283158	
DATE	9-20-63					CHANGE	

MS-1102



PART NO.	CODE	FOR GAS LINE PIPE				SLEEVE					
		MAX. GWP PSI	NOMINAL SIZE	OUTSIDE DIA.	MINIMUM THICKNESS	OUTSIDE DIA.	INSIDE DIA.	MINIMUM THICKNESS	LENGTH	LONGITUDINAL WELD	WT. LBS.
A		800	3/4	1.050	.113	1.375	1.135	.120	4	SEAMLESS	.5
B		"	1-1/4	1.660	.140	2.000	1.760	.120	6	"	1.2
C	022206	"	2	2.375	.154	3	2-5/8	3/16	8	Full	3.9
D	022207	"	3	3.500	.148	4-1/8	3-3/4	3/16	8	"	5.2
E	022149	"	4	4.500	.148	5-1/8	4-3/4	3/16	8	"	6.8
F	022208	"	6	6.625	.1875	7-3/8	6-7/8	1/4	8	Tack	13
G	022184	"	8	8.625	.220	9-1/2	8-7/8	5/16	8	"	21
H		"	10	10.750	.259	11-3/4	11	3/8	8	"	31
J		500	10	10.750	.203	11-3/4	11	3/8	8	"	31
K		800	12	12.750	.3125	13-7/8	13	7/16	10	"	54
L	022185	500	12	12.750	.203	13-5/8	13	5/16	10	"	38
M		800	16	16	.401	17-1/4	16-1/4	1/2	14	"	105
N		500	16	16	.250	17	16-1/4	3/8	14	"	78
O		"	20	20	.28125	21-1/8	20-1/4	7/16	16	"	129
P		"	22	22	.3125	23-1/8	22-1/4	7/16	16	"	141
Q		"	24	24	.28125	25-1/4	24-1/4	1/2	16	"	177
R		"	26	26	.375	27-1/4	26-1/4	1/2	16	"	190

ALL DIMENSIONS IN INCHES.

PARTS A & B TO BE MADE OF HOT DRAWN STEEL TUBING, MS-1

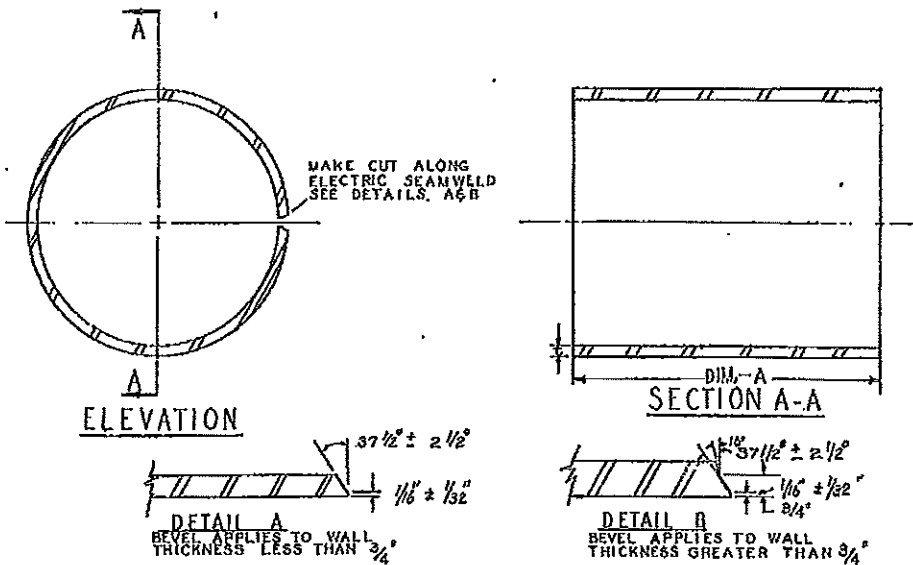
TENSILE STRENGTH OF STEEL FOR SLEEVES 60,000 PSI.

ORDER SLEEVE AS FOLLOWS:-

"WELDING SLEEVE FOR _____ INCH O.D. GAS LINE PIPE, MAX. GWP _____ PSI, PART NO. _____ AND CODE NO. _____ AS PER MS-1102"

IF FULL LONGITUDINAL WELD IS WANTED ON SLEEVES FOR 8" TO 26" PIPE SPECIFY ON ORDER

APPROVED		WELDING SLEEVES FOR STEEL GAS MAINS		SUPERSEDED BY	
BY		PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.		SUPERSEDED BY	
DR.				SHEET NO.	
CH.				DRAWING NUMBER	
O.K.				081439	
DATE	SCALE				
1-4-45	NONE				



DESIGN CATEGORY AND PRESSURE	NOMINAL PIPE SIZE	LENGTH DIM. "A"	THICKNESS DIM. "t"	MATERIAL
I, II (0-175 P.S.I.)	4"-16"	12"	EQUAL TO PIPELINE	SEE TABLE BELOW
	18"-36"	18"		
III, IV (175-720 P.S.I.)	4"	12"	1.42 TIMES PIPELINE THICKNESS	
	6"-16" 18"-36"	12" 18"		
V, VI (721-1040 P.S.I.)	4"-16" 18"-36"	12" 18"		

- DESIGN BASED ON G.O. 112-A, PAR. 841.1 STEEL PIPE DESIGN FORMULA FOR TYPE "C" CONSTRUCTION. CATEGORY II THRU VI IS DESIGNED FOR 100% LONGITUDINAL STRENGTH OF PIPELINE.
- ENDS MAY BE EITHER MACHINE OR FLAME CUT, ALL FLAME CUTS SHALL BE GROUND TO REMOVE OXIDES AND PRESENT A CLEAN SURFACE FOR WELDING.
- THE MATERIAL SHALL BE FREE FROM INJURIOUS DEFECTS, SUCH AS GOUSES, ARC BURNS, CHIPS, AND DENTS AND SHALL HAVE A WORKMANLIKE FINISH.
- WHEN ORDERING, SPECIFY IF SLEEVE IS TO BE SPLIT ON ONE OR TWO SIDES.
- WHEN INSTALLING, ANY UNDERLYING WELD BEADS INTERFERING WITH FIT-UP SHALL BE GROUND SMOOTH.
- YIELD STRENGTH OF PIPE SLEEVE MATERIAL SHALL BE AT LEAST EQUAL TO THE YIELD STRENGTH OF PIPE MATERIAL.
- SLEEVE TO FIT OVER EXTERNAL DIAMETER OF PIPE.

PIPE MATERIAL	NORMAL USE	SLEEVE MATERIAL
A.P.I.-5L GRD. B PIPE	THRU 4" PIPE	EQUAL TO PIPE
A.P.I.-5LX GRD. X 42	6" - 16" PIPE	
A.P.I.-5LX GRD. X 42	18" - 36" PIPE	EQUAL TO PIPE OR ASTM-A-242 50,000 P.S.I. MIN. YIELD STRENGTH KAISALOY OR TRI-TEN
A.P.I.-5LX GRD. X 52		

OUTSIDE DIA. AT BEVEL	INSIDE DIA. AT ENDS	WALL THICKNESS	OUT-OF-ROUNDNESS	CIRCUMFERENTIAL	LENGTH
± 1/8"	± 1/8"	± 12.5%	± 1/16"	+ 9/32" - 3/32"	± 1/4"

APPROVED	NO.	DATE	DESCRIPTION
	3	8-65	CORRECTION TO NOTES
	2	4-65	ADDED NOTE 7
	1	12-1-64	CHANGED MATERIAL NOTE

SUPERV. BY DR. R. WALLER		GAS STANDARD		SUPERSEDES 083699	
CH. O.K.		GAS MAIN WELDING SLEEVES		SUPERSEDED BY	
DATE 7-6-64	SCALE NONE	PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA		SHEET NO. 283226	SHEETS 3

Nominal Size: (Inches)	Wall Thickness (Inches)	Design Pressure (psi) By Construction Types							
		Grade B Yield 35,000 psi				Yield 42,000 psi			
		A	B	C	D	A	B	C	D
3/4	.113	5424	4520	3767	3013				
1	.133	5097	4247	3540	2832				
1-1/4	.140	4250	3542	2952	2361				
1-1/2	.145	3846	3205	2671	2137				
2	.154	3267	2723	2269	1815				
3	.216	3110	2592	2160	1728				
4	.237	2655	2212	1844	1475				
6	.280	2130	1775	1479	1183				
6	.432	3286	2738	2282	1826				
8	.322	1881	1568	1307	1045				
8	.500	2921	2434	2029	1623				
10	.365	1711	1426	1189	951				
10	.500	2344	1954	1628	1302				
12	.375	1482	1235	1030	824				
12	.500	1976	1647	1373	1098	2372	1976	1647	1318
16	.375	1182	985	821	656	1417	1181	984	787
16	.500	1575	1313	1094	875	1890	1575	1313	1050
20	.375	945	787	656	525	1134	945	788	630
20	.500	1260	1050	875	700	1512	1260	1050	840
22	.375	859	716	591	477	1031	859	716	573
22	.500	1146	955	796	656	1375	1145	955	764
24	.375	788	656	547	438	945	788	656	525
24	.500	1050	875	730	584	1260	1050	875	700

1. For steel butt welding fittings operating at temperatures between 0° and 250° F.
2. Construction Type A and B values not to be used without clearance from Gas System Design Department.
3. For other allowable working pressures see ~~SP-1664~~ Appendix "B".

D-33

APPROVED BY									
SUPERV. BY									
DSGN.									
DR.									
CH.									
C.K.									
DATE	SCALE	ORG.	DATE	DESCRIPTION	CHK	BY	CHK	APPRD	
3-64			3-66	ADDED NOTE 3					
GAS STANDARD ALLOWABLE WORKING PRESSURES STEEL BUTT-WELDING FITTINGS PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.					DRAWING LIST SUPERSEDED BY SUPERSEDED BY SHEET NO. SHEETS DRAWING NUMBER CHANGE 083792 1				